

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of :
Yukinobu TADA, et al. :
Serial No.: : Group Art Unit:
Filed: : Examiner:
For: OFFICIAL DISC APPARATUS AND FOCUS JUMP METHOD

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, DC 20231

Sir:

Prior to examination of the above-referenced application, please amend the application as follows:

IN THE CLAIMS:

1. (Amended) An optical disc apparatus having a focus jump function for enabling a focus control on each of a plurality of recording layers of a disc, comprising:

an objective lens for focusing laser light on a recording layer of the disc;

focus error signal generating means for generating a focus error signal based on

5 reflection light that is obtained through the objective lens;

generating means for generating, based on the focus error signal, a focus control signal for controlling the objective lens;

drive voltage generating means for outputting a voltage [necessary] to move the

objective lens;

10 moving means for moving the objective lens in a direction approximately perpendicular to the recording layers of the disc in accordance with the output voltage of the drive voltage generating means; and

speed detecting means for detecting a movement speed of the objective lens,

wherein [a] the movement speed of the objective lens is detected during a focus
15 jump, a lens drive signal corresponding to the detected movement speed is supplied to the moving means, and an end position of the focus jump is determined based on behavior of the focus error signal immediately before an end of the focus jump, whereby [a] the focus control is forcibly pulled, from a first focus point corresponding to one recording layer, into a second focus point corresponding to another recording layer.

20

5. (Amended) An optical disc apparatus having a focus jump function for enabling a focus control on each of a plurality of recording layers of a disc, comprising:

an objective lens for focusing laser light on a recording layer of the disc;

a signal processing circuit for generating a focus error signal based on reflection

5 light that is obtained through the objective lens;

a focus control circuit for generating, based on the focus error signal, a focus control signal for controlling the objective lens;

a drive voltage generating circuit for outputting a drive voltage [necessary] to move a focus position of the objective lens between recording layers;

10 an actuator for moving the objective lens in a direction approximately perpendicular to the recording layers of the disc in accordance with the output voltage of

the drive voltage generating circuit; and

a differentiation circuit for detecting a movement speed of the objective lens by differentiating the focus error signal,

15 wherein [a] the movement speed of the objective lens is detected during a focus jump, a lens drive signal corresponding to the detected movement speed is supplied to the actuator, and an end position of the focus jump is determined based on behavior of the focus error signal immediately before an end of the focus jump, whereby[a] the focus control is forcibly pulled, from a first focus point corresponding to one recording layer,
20 into a second focus point corresponding to another recording layer.

14. (Amended) The optical disc apparatus according to claim 7 [,9, or 11] wherein the drive voltage generating means generates:

a first voltage value as an acceleration voltage that causes the objective lens to approach the disc and a second voltage value as a deceleration voltage that causes the
5 objective lens to go away from the disc in moving the objective lens from [one] a first recording layer to [another] a second recording layer that is more distant from the objective lens than the [one] first recording layer is, and [wherein the drive generating means generates]

a third voltage value as an acceleration voltage that causes the objective lens to go
10 away from the disc and a fourth voltage value as a deceleration voltage that causes the objective lens to approach the disc in moving the objective lens from a third [one] recording layer to [another] a fourth recording layer that is closer to the objective lens than the [one] third recording layer is.

15. (Amended) A focus jump method of an optical disc apparatus having a focus jump function for enabling a focus control on each of a plurality of recording layers of a disc on and from which data can be recorded and reproduced, comprising the steps of:

detecting a current position of an objective lens while recording data on the disc;

5 judging whether a position where to record data next is located in a recording layer on which the objective lens is currently focused;

if it is judged that the position where to record data next is not located in [a] the recording layer on which the objective lens is currently focused and hence a first focus jump is necessary, switching laser power from a high power for data recording to such a
10 low power that neither data recording nor erasure [cannot] can be effected;

performing [a] the first focus jump after switching the laser power to the [lower] low power;

judging whether a focus position of the objective lens will deviate from a target recording layer based on a level of a focus error signal that is obtained when the focus
15 position of the objective lens reaches the target recording layer as a result of the first focus jump;

if it is judged that the focus position of the objective lens will deviate from the target recording layer, performing control so that the focus position of the objective lens will not deviate from the target recording layer by driving the objective lens forcibly;

20 judging whether the focus position of the objective lens has been pulled into the target recording layer by the control of preventing the focus position of the objective lens from deviating from the target recording layer;

if it is judged that the focus position of the objective lens has not been pulled into the target recording layer, performing a second focus jump [again from the start]; and

25 if it is judged that the focus position of the objective lens has been pulled into the target recording layer;[,]

moving a laser spot to a target recording start position in the target recording layer,

switching the laser power from the [lower] low power to the high power,

30 and

restarting data recording.

16. (Amended) The optical disc apparatus according to claim 7 [any one of claims 7 to 13], wherein [a] the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and [a] the focus jump is started in processing an address portion that is not to be recorded on the disc after
5 writing of a data portion.

17. (New) The optical disc apparatus according to claim 9 wherein the drive voltage generating means generates:

a first voltage value as an acceleration voltage that causes the objective lens to approach the disc and a second voltage value as a deceleration voltage that causes the
5 objective lens to go away from the disc in moving the objective lens from a first recording layer to a second recording layer that is more distant from the objective lens than the first recording layer is, and

a third voltage value as an acceleration voltage that causes the objective lens to go away from the disc and a fourth voltage value as a deceleration voltage that causes the objective lens to approach the disc in moving the objective lens from a third recording layer to a fourth recording layer that is closer to the objective lens than the third recording layer is.

18. (New) The optical disc apparatus according to claim 11 wherein the drive voltage generating means generates:

a first voltage value as an acceleration voltage that causes the objective lens to approach the disc and a second voltage value as a deceleration voltage that causes the objective lens to go away from the disc in moving the objective lens from a first recording layer to a second recording layer that is more distant from the objective lens than the first recording layer is, and

a third voltage value as an acceleration voltage that causes the objective lens to go away from the disc and a fourth voltage value as a deceleration voltage that causes the objective lens to approach the disc in moving the objective lens from a third recording layer to a fourth recording layer that is closer to the objective lens than the third recording layer is.

19. (New) The optical disc apparatus according to claim 8, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

20. (New) The optical disc apparatus according to claim 9, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

21. (New) The optical disc apparatus according to claim 10, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

22. (New) The optical disc apparatus according to claim 11, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

23. (New) The optical disc apparatus according to claim 12, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

24. (New) The optical disc apparatus according to claim 13, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose

addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

REMARKS

The present amendments are not intended to narrow any of the recited claims features; but, instead, are intended to address informalities that arose from translating the priority document(s) into English. No new subject matter has been added by any of the amendments.

Respectfully submitted,

MCDERMOTT, WILL & EMERY


Wesley L. Strickland

Registration No. 44,363

600 13th Street, N.W.
Washington, DC 20005-3096
(202) 756-8000 WLS:MWE
Date: August 22, 2001
Facsimile: (202) 756-8087

CLEAN COPY OF THE CLAIMS:

1. (Amended) An optical disc apparatus having a focus jump function for enabling a focus control on each of a plurality of recording layers of a disc, comprising:

an objective lens for focusing laser light on a recording layer of the disc;

focus error signal generating means for generating a focus error signal based on

5 reflection light that is obtained through the objective lens;

generating means for generating, based on the focus error signal, a focus control signal for controlling the objective lens;

drive voltage generating means for outputting a voltage to move the objective lens;

moving means for moving the objective lens in a direction approximately

10 perpendicular to the recording layers of the disc in accordance with the output voltage of the drive voltage generating means; and

speed detecting means for detecting a movement speed of the objective lens,

wherein the movement speed of the objective lens is detected during a focus jump,

a lens drive signal corresponding to the detected movement speed is supplied to the

15 moving means, and an end position of the focus jump is determined based on behavior of the focus error signal immediately before an end of the focus jump, whereby the focus control is forcibly pulled, from a first focus point corresponding to one recording layer, into a second focus point corresponding to another recording layer.

5. (Amended) An optical disc apparatus having a focus jump function for enabling a focus control on each of a plurality of recording layers of a disc, comprising:

an objective lens for focusing laser light on a recording layer of the disc;

a signal processing circuit for generating a focus error signal based on reflection

5 light that is obtained through the objective lens;

a focus control circuit for generating, based on the focus error signal, a focus control signal for controlling the objective lens;

a drive voltage generating circuit for outputting a drive voltage to move a focus position of the objective lens between recording layers;

10 an actuator for moving the objective lens in a direction approximately perpendicular to the recording layers of the disc in accordance with the output voltage of the drive voltage generating circuit; and

a differentiation circuit for detecting a movement speed of the objective lens by differentiating the focus error signal,

15 wherein the movement speed of the objective lens is detected during a focus jump, a lens drive signal corresponding to the detected movement speed is supplied to the actuator, and an end position of the focus jump is determined based on behavior of the focus error signal immediately before an end of the focus jump, whereby the focus control is forcibly pulled, from a first focus point corresponding to one recording layer, into a
20 second focus point corresponding to another recording layer.

14. (Amended) The optical disc apparatus according to claim 7 wherein the drive voltage generating means generates:

a first voltage value as an acceleration voltage that causes the objective lens to approach the disc and a second voltage value as a deceleration voltage that causes the

5 objective lens to go away from the disc in moving the objective lens from a first recording layer to a second recording layer that is more distant from the objective lens than the first recording layer is, and

a third voltage value as an acceleration voltage that causes the objective lens to go away from the disc and a fourth voltage value as a deceleration voltage that causes the
10 objective lens to approach the disc in moving the objective lens from a third recording layer to a fourth recording layer that is closer to the objective lens than the third recording layer is.

15. (Amended) A focus jump method of an optical disc apparatus having a focus jump function for enabling a focus control on each of a plurality of recording layers of a disc on and from which data can be recorded and reproduced, comprising the steps of:

detecting a current position of an objective lens while recording data on the disc;
5 judging whether a position where to record data next is located in a recording layer on which the objective lens is currently focused;

if it is judged that the position where to record data next is not located in the recording layer on which the objective lens is currently focused and hence a first focus jump is necessary, switching laser power from a high power for data recording to such a
10 low power that neither data recording nor erasure can be effected;

performing the first focus jump after switching the laser power to the low power;
judging whether a focus position of the objective lens will deviate from a target recording layer based on a level of a focus error signal that is obtained when the focus position of the objective lens reaches the target recording layer as a result of the first focus

15 jump;

if it is judged that the focus position of the objective lens will deviate from the target recording layer, performing control so that the focus position of the objective lens will not deviate from the target recording layer by driving the objective lens forcibly;

judging whether the focus position of the objective lens has been pulled into the target recording layer by the control of preventing the focus position of the objective lens from deviating from the target recording layer;

if it is judged that the focus position of the objective lens has not been pulled into the target recording layer, performing a second focus jump; and

if it is judged that the focus position of the objective lens has been pulled into the target recording layer:

moving a laser spot to a target recording start position in the target recording layer,

switching the laser power from the low power to the high power, and restarting data recording.

30

16. (Amended) The optical disc apparatus according to claim 7, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

17. (New) The optical disc apparatus according to claim 9 wherein the drive voltage generating means generates:

a first voltage value as an acceleration voltage that causes the objective lens to approach the disc and a second voltage value as a deceleration voltage that causes the objective lens to go away from the disc in moving the objective lens from a first recording layer to a second recording layer that is more distant from the objective lens than the first recording layer is, and

a third voltage value as an acceleration voltage that causes the objective lens to go away from the disc and a fourth voltage value as a deceleration voltage that causes the objective lens to approach the disc in moving the objective lens from a third recording layer to a fourth recording layer that is closer to the objective lens than the third recording layer is.

18. (New) The optical disc apparatus according to claim 11 wherein the drive voltage generating means generates:

a first voltage value as an acceleration voltage that causes the objective lens to approach the disc and a second voltage value as a deceleration voltage that causes the objective lens to go away from the disc in moving the objective lens from a first recording layer to a second recording layer that is more distant from the objective lens than the first recording layer is, and

a third voltage value as an acceleration voltage that causes the objective lens to go away from the disc and a fourth voltage value as a deceleration voltage that causes the objective lens to approach the disc in moving the objective lens from a third recording layer to a fourth recording layer that is closer to the objective lens than the third recording layer is.

19. (New) The optical disc apparatus according to claim 8, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

20. (New) The optical disc apparatus according to claim 9, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

21. (New) The optical disc apparatus according to claim 10, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

22. (New) The optical disc apparatus according to claim 11, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

23. (New) The optical disc apparatus according to claim 12, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose

addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.

5

24. (New) The optical disc apparatus according to claim 13, wherein the focus jump is necessary in a case where during continuous data recording there occurs data whose addresses bridge two recording layers, and the focus jump is started in processing an address portion that is not to be recorded on the disc after writing of a data portion.